Schistosomiasis

WRAIR- GEIS 'Operational Clinical Infectious Disease' Course

Acknowledgments

- Paula Mischler, PhD MPH

Walter Reed Army Institute of Research

Disclaimer

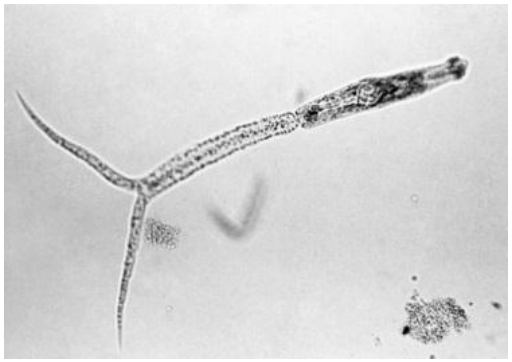
The views expressed in this presentation are those of the speaker and authors, and do not reflect the official policy of the Department of Army, Department of Defense, or U.S. Government

Lecture Objectives

- Increase knowledge of:
  - Epidemiology of Schistosomiasis
  - Disease Prevention
  - Disease Treatment

Introduction

- Schistosomiasis
  - Caused by parasitic trematode (fluke) in the Genus Schistosoma
  - 2nd most common parasitic disease behind Malaria
  - More than 40 million people were treated in 2013

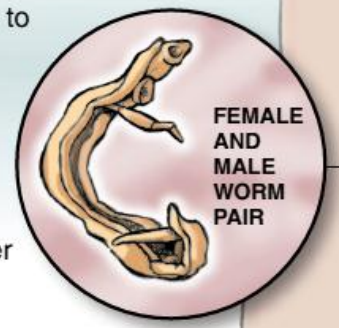


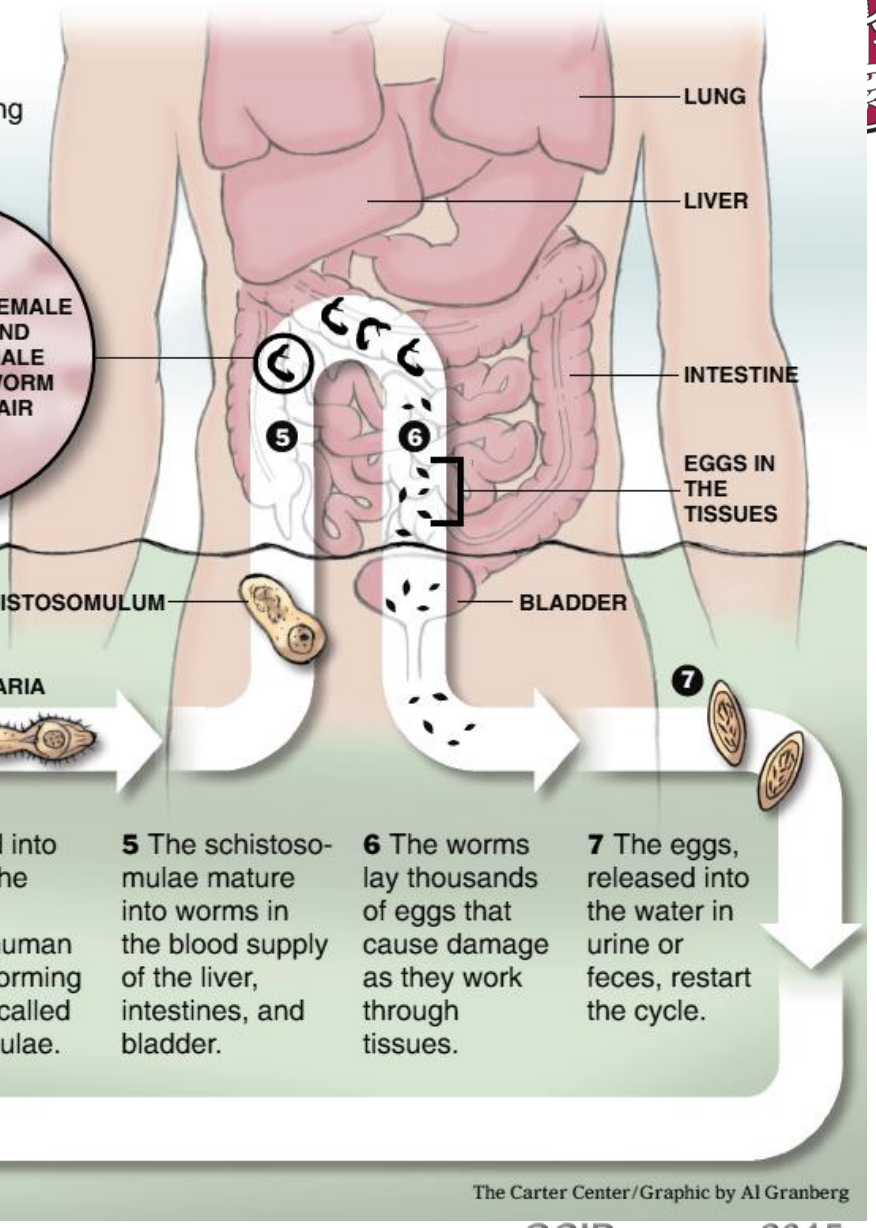
Military Relevance

- Historically a medical problem from the age of the Napoleonic conquests
- Several hundred British and Australian troops infected in Egypt during World War I
- During World War II, over 1,500 British and African troops became infected in Nigeria
- During the invasion of Leyte hundreds of US service members became infected
- During World War II, many Puerto Rican nationals applying for enlistment with the US Army were turned away based on positive stool samples

The Life Cycle of Schistosomiasis

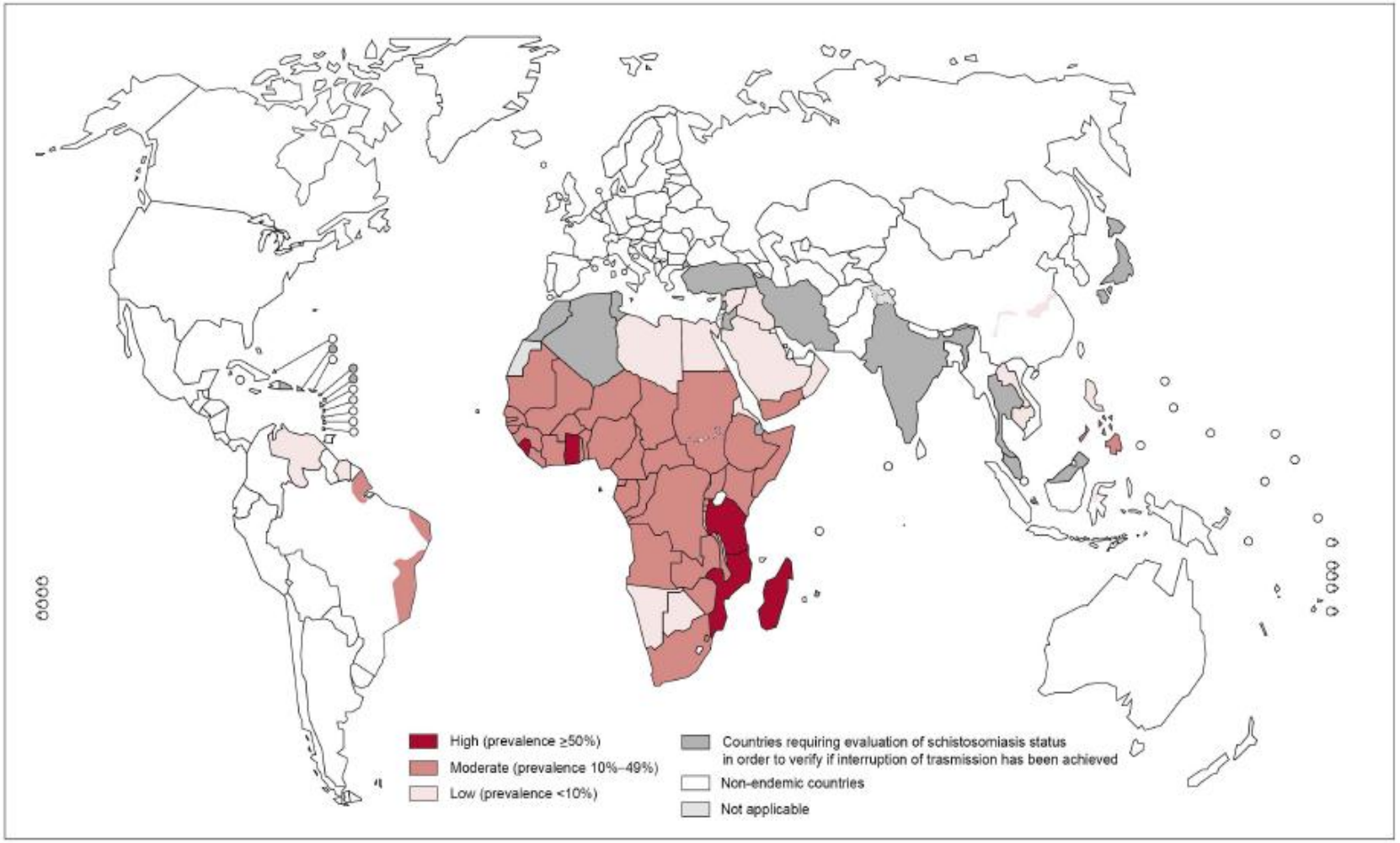
Schistosomiasis affects more than 200 million people worldwide. The parasitic larvae live in fresh water and can penetrate human skin, placing people at risk through everyday activities such as washing laundry or fetching water. Inside the victim's body, adult female worms lay thousands of eggs that cause significant damage to internal organs, most commonly from scarring the intestines, bladder, kidneys, liver, or lungs. Children suffer the most from schistosomiasis, which causes poor growth and impaired cognitive function. The disease is completely preventable and can be controlled through an annual inexpensive drug treatment, health education, and access to safe water and sanitation.





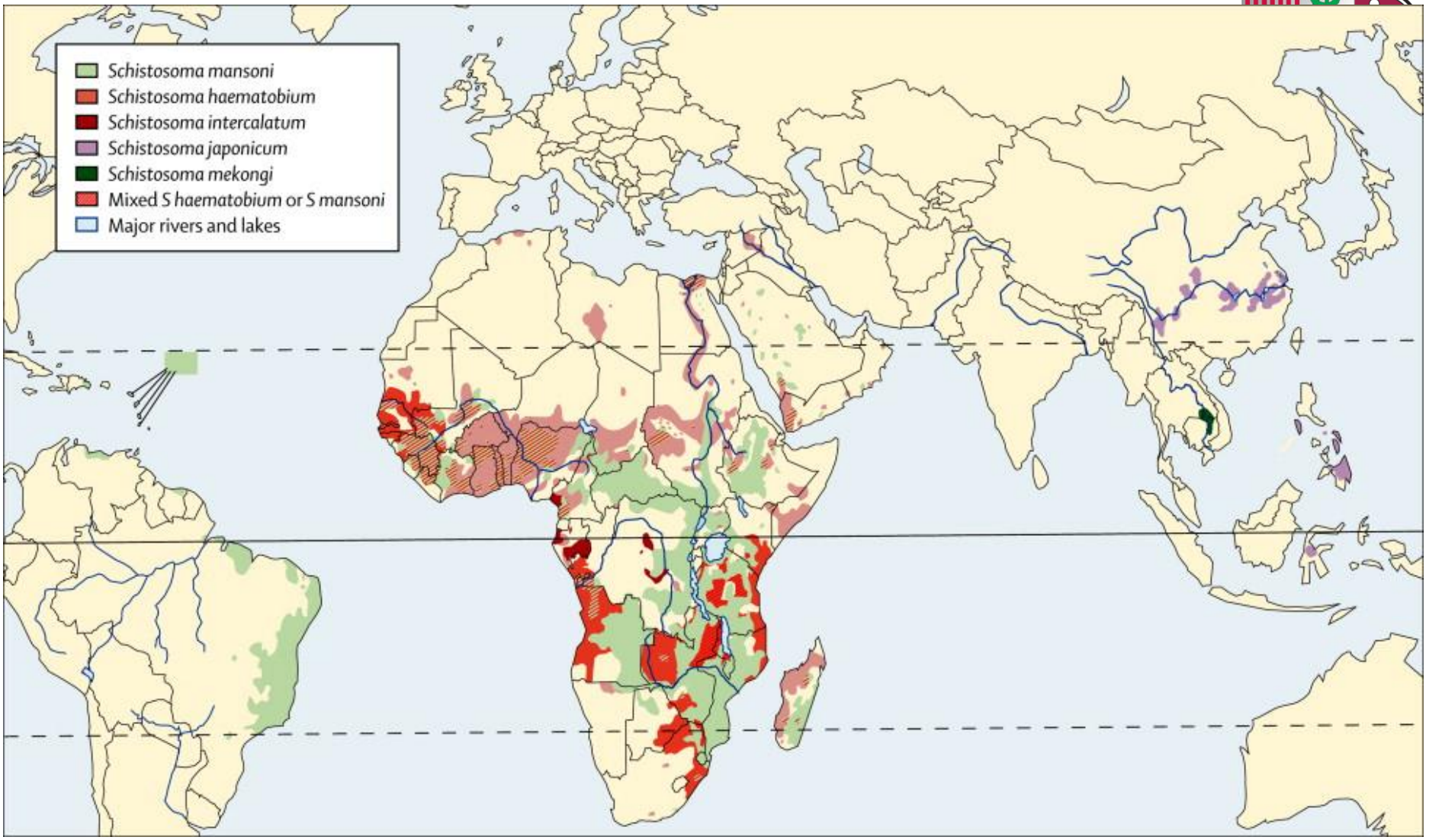
Type of infection	Parasite species	Definitive host	Snail vector	Geographic location
Urogenital schistosomiasis	*S. haematobium*	humans, non human primates	*Bulinus*	AFRICOM, CENTCOM
Intestinal schistosomiasis	*S. intercalatum*	humans, rodents, cattle	*Bulinus, Physopsis*	AFRICOM
	S. japonicum	humans, ruminants carnivores	*Oncomelania*	PACOM (China, Indonesia, the Phillipines)
	S. mansoni	humans, rodents	*Biomphalaria*	AFRICOM, SOUTHCOM
	S mekongi	humans, dogs, cats	*Oncomelania*	PACOM (Laos and Cambodia)

Distribution of schistosomiasis, worldwide, 2011



Data Source: World Health Organization
Map Production: Control of Neglected Tropical Diseases (NTD)
World Health Organization

World Health Organization



Colley, Daniel G., et al. "Human schistosomiasis." *The Lancet* 383.9936 (2014): 2253-2264

Clinical Signs and Symptoms

- Incubation can range from 14-84 days
- Many people are asymptomatic with subclinical disease
- Acute infection can present as Katayama syndrome
  - rash, fever, headache, myalgia, respiratory symptoms, diarrhea (with or without blood)
  - Eosinophilia, hepato- and/or splenomegaly

Clinical Signs and Symptoms

Symptoms

- Fever
- Chills
- Sweating
- Headache
- Cough
- Diarrhea (50 %)
- Weight Loss

Signs

- Lymphadenopathy
- Hepatomegaly (50 %)
- Splenomegaly (10%)

Clinical Presentation

- Itchy rash at the site of parasite penetration
- Abrupt onset of fever (approximately 4-8 weeks post exposure)
- Fever may be accompanied by abdominal pain, bloody stool/urine, cough, lymphadenopathy, and hepatosplenomegaly.
- Gastrointestinal symptoms appear 6-12 weeks post exposure

Maculopapular Rash

Gray, Darren J., et al. "Diagnosis and management of schistosomiasis." *BMJ* 342 (2011).

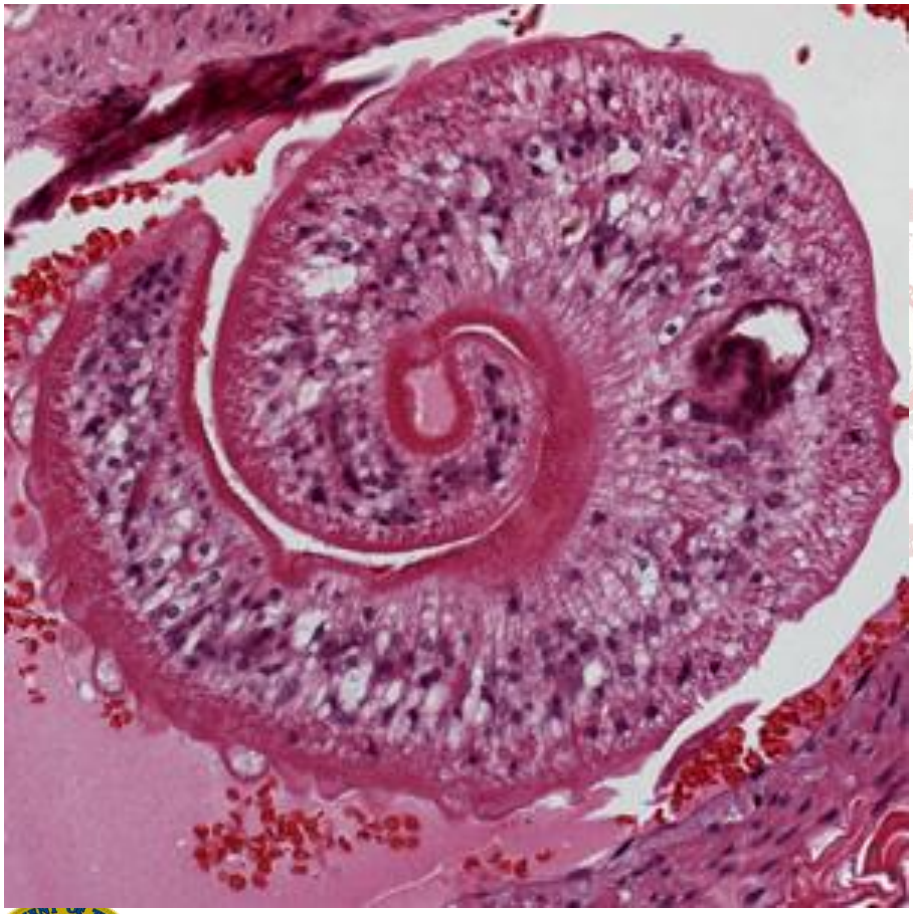
Hematurea

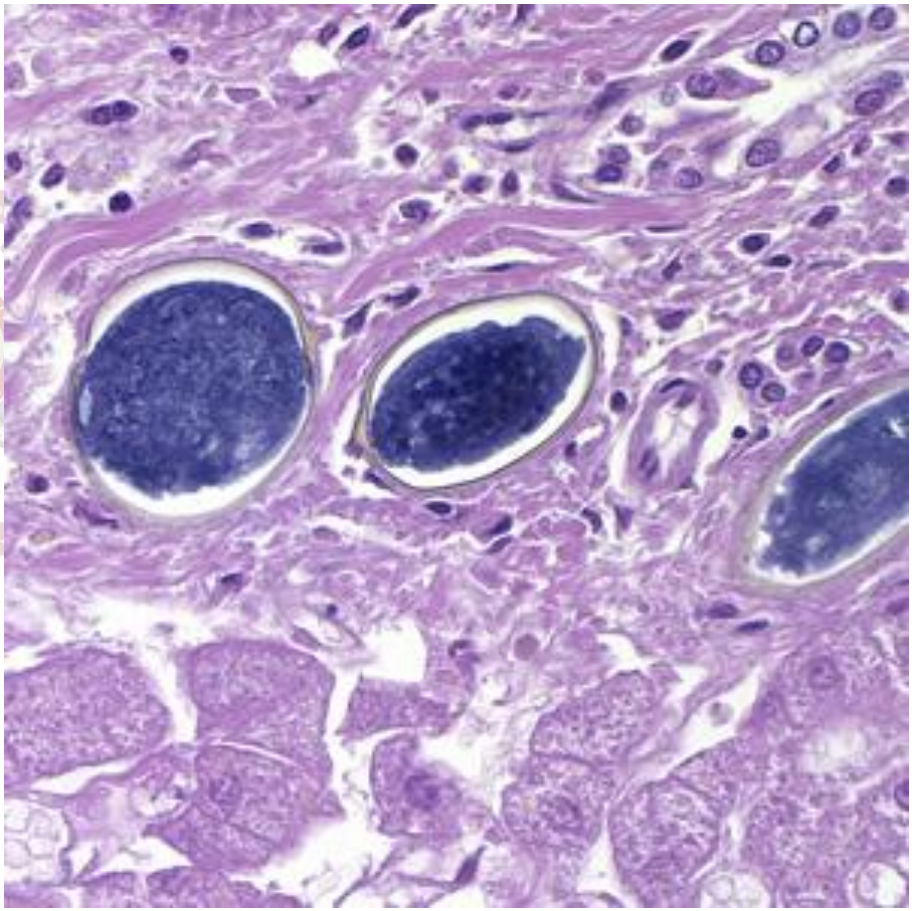
In Nasarawa North in Nigeria, 12-year-old Dauda Usman holds a sample of his urine, which is red with blood, a sign of schistosomiasis.
Carter Center Photo: Emily Staub

Hepato and Spleenomegaly

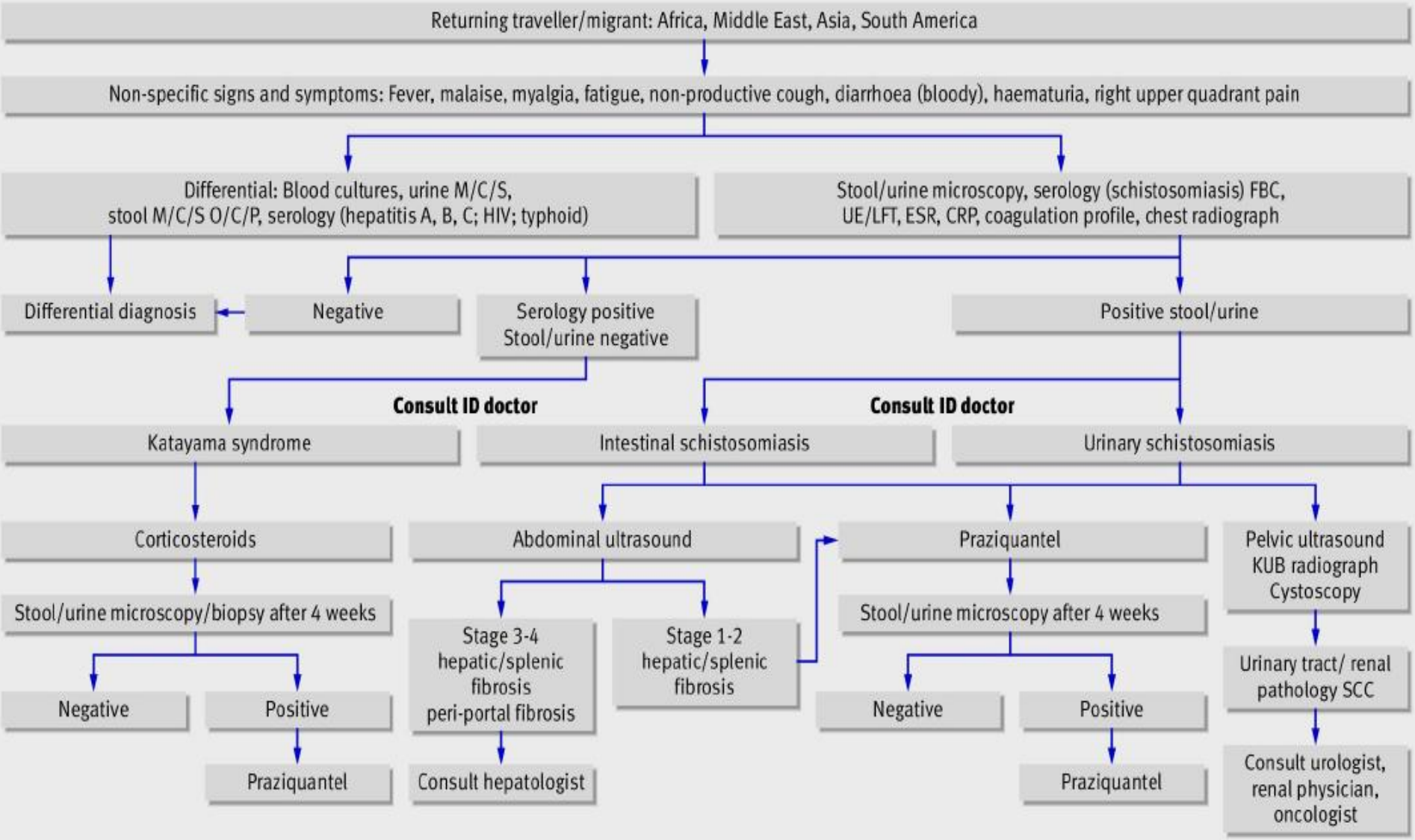
Child with schistosomiasis; credit; Project Crevette

Tissue Stains





Courtesy of CDC image library



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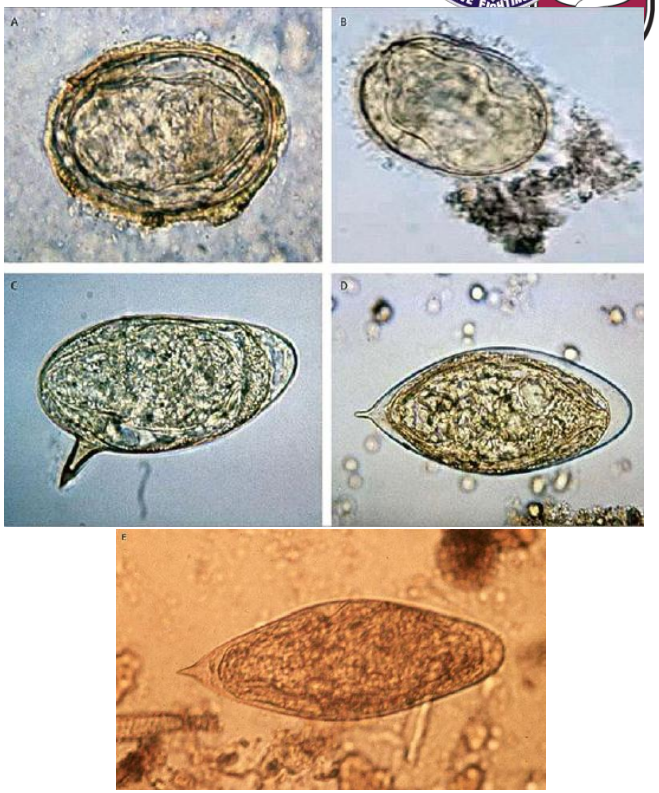
Diagnosis

- Hematology
  - Eosinophilia (>500 cell/mm^3)
- Microbiology
  - Eggs in stool or urine sample
    - 2-6 weeks
- Serology
  - Immunofluorescent antibody test (IFA)
  - Indirect hemagglutination assays (IHA)
  - Enzyme-linked immunosorbent assay (ELISA)
    - Not useful in acute schistosomiasis or for people living in endemic areas
- Travel History



Courtesy of CDC image library

Treatment

- Treatment should be 6-8 weeks after last exposure to potentially contaminated water
- Praziquantel
  - 2 doses of 20mg/kg for one day
    - *S. mansoni, S. haematobium, S. intercalatum*
  - 3 doses of 20mg/kg for one day
    - *S. japonicum, S. mekongi*
  - Repeated treatment may be needed after 2-4 weeks
  - Follow up positive pre-treatment stool/urine exam 1 to 2 months post treatment

Prevention

- Avoidance of fresh water sources
  - Vigorous towel drying for brief accidental contact
- When using water from fresh water sources, boil for at least 1 minute
- When water contact cannot be avoided, use preventive chemotherapy
- PPE where appropriate (rubber waders, boots

Control

- Mass drug administration programs
- Snail Control
  - Chemical Control through molluscides
  - Biological Control through snail natural enemy introduction
  - Environmental modification
- Health Education
- Improved sanitation

Questions?

MY UNCLE HAS A PARASITE IN HIS WALL.